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Navigating the Murk: Ethical and Practical Considerations for the Surgical Treatment of the Sacroiliac Joint Syndrome

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Summary: The field of spine surgery has many controversies. The surgical treatment of the sacroiliac (SI) joint is, too, fraught with debate. The diagnosis of painful SI joints is currently limited to relief following "diagnostic" injections and pain generated from a suite of clinical maneuvers. Diagnoses of SI joint dysfunction are dependent entirely on patient-reported responses to provocative maneuvers and invasive procedures. There is a glaring lack of objective radiographic and objective physical examination findings for this syndrome. The evidence for treatment, and specifically for the surgical treatment of the SI joint is reviewed and critiqued. Although the surgical techniques are simple, consensus is elusive for both indication and optimal technique. Ethical principles for surgical innovation and practical considerations for the treatment of the SI joint syndrome are discussed at length. Discussed as well are key points to consider when providing informed consent to a patient before proceeding with surgical intervention for this procedure and diagnosis. Spine surgery is a field with considerable regional variation in practice. Even today, the precise indications for arthrodesis, extent, and approach, remain frequently debated; however, as much conversation takes place surrounding lumbar surgery, even more confusion, bias, opinion, and deliberation exists when surgical treatment of the SI joint is considered. This chapter discusses the unique challenges associated with the SI joint and provides practical considerations for the treatment thereof.

Key Words: SI joint syndrome—SI joint fusion—ethics—low back pain.

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KEY POINTS

- Diagnosis of painful sacroiliac (SI) joints is currently limited to relief following "diagnostic" injections and pain generated from a suite of clinical maneuvers.[1]
- Diagnoses of SI joint dysfunction are dependent entirely on patient-reported responses to provocative maneuvers and invasive procedures and lacks objective radiographic findings or objective physical examination findings.
- Caution must be applied in interpreting "evidence" for surgical "fusion" of the SI joint.
- Surgical techniques for this procedure are simple, yet consensus on clear indications and optimal technique remain elusive.
- Ethical principles and practical considerations for the treatment of SI joint syndrome are discussed.

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For reprint requests, or additional information and guidance on the techniques described in the article, please contact Robert W. Bina, MD, MS, at rwbina@email.arizona.edu or by mail at University of Arizona-Tucson, Tucson, AZ. You may inquire whether the author(s) will agree to phone conferences and/or visits regarding these techniques.

INTRODUCTION

As the US population ages with an estimated 1000 people enrolling in Medicare daily,[2] the incidence and prevalence of symptomatic complaints related to aging are dramatically increasing in all aspects of health care. Low back pain, a fated result of bipedal human evolution, is often encountered and, frequently, inadequately recognized and treated in primary care and subspecialty clinics. Because of the exquisitely engineered function and interplay of the axial and appendicular skeleton,[3,4] in the absence of nerve compression or frank bony instability with the host of supporting soft tissues and nervous control, accurate diagnosis of the etiology of the pain becomes problematic.

The diagnostic algorithm for etiologies of low back pain often includes an assessment for radicular symptoms due to nerve root compression[5] or claudicatory symptoms from central spinal stenosis. After those classic diagnoses, diagnosis becomes poachy with a poor signal to noise ratio. Identification of symptomatic patterns through clinical evaluation, both history and examination,[6] become the lanterns by which the fog of subjective data are illuminated. The most astute clinician must navigate the murky balance between discogenic back pain and asymptomatic radiographic degeneration, facetogenic back pain, and asymptomatic age-appropriate changes, and symptomatic or asymptomatic pars interarticularis defects. Despite the controversy in treating those diagnoses surgically, degenerative disc disease, facet arthrosis, and pars defects can all be identified through objective radiographic imaging. What separates the SI joint from these potential pain generators is the current lack of reliable radiographic findings that can be used to rule out SI joint dysfunction as a diagnosis. The phrase "dysfunction" captures the challenge that surgeons face in managing SI joint pain. Pain, purely a patient's subjective experience, must be taken at truth. However, dysfunction implies an injury that responds to surgery. Thus, as surgeons, we are not merely working to identify SI joint pain—we are working to identify SI joint pain where the benefits of interventions, such as surgery, outweigh the potential risks.

Before further discussion of the SI joint, historical examination of the management of lumbar disc herniations can be instructive for parallel comparison. Lumbar radiculopathy from disc herniation is a condition in the general parlance and is a staple of the anatomy curriculum taught to first-year medical students. Among spine surgeons, few would criticize a "standard" open discectomy with examination of the nerve root as a reasonable approach to management of a symptomatic lumbar disc herniation. The natural history and surgical outcomes for primary lumbar disc herniation has been well studied.[7] Relying on this extensive body of literature and

clinical experience, spine surgeons can offer a concise and considered informed consent highlighting the pertinent, reasonably foreseeable risks, benefits, and alternatives of surgery versus nonsurgical management.

This clean, concise approach, however, was not always the standard of care. In the 1950s, debate raged over whether fusion was indicated in the treatment of ruptured intervertebral discs. Conservative neurosurgeons advocated for simple removal of the herniated disc fragment when leg pain predominated symptomatology, while orthopedic spine surgeons countered by arguing for bony fusion in conjunction with fragmentectomy. Dr Ralph Cloward,[8] an eminent and pioneering forefather of spine surgery, wrote "all lumbar disc operations should be accompanied by a spinal fusion." Before Cloward and his contemporaries in the 1950s, the treatment of intervertebral disc herniation into the spinal canal might have been approached with a transdural approach! Mixter and Ayer[9] report in a 1935 *New England Journal of Medicine* article an approach for disc herniation with a laminectomy that "may be limited to two or three vertebrae … removing the articular facets to give wider exposure." The authors note that "It is sometimes necessary to remove part of one pedicle … at other times it is easier to open the dura and then incise it again over the lesion." Although the transdural approach to decompression of a hernieated disc is clearly archaic and is often met with disbelief when discovered by the young surgeon, even the surgeons in the era of the Great Depression could rely on fluoroscopic myelography to provide objectively verifiable evidence of a disc herniation. Thus, it is likely that the SI joint is the only anatomic region of the spine that a neurosurgeon or orthopedic spine surgeon considers operating on in the absence of a clear radiographic finding. This uncertainty should be of concern to both surgeons and patients. Nevertheless, just as the patient in 1935 had to accept that state of the art treatment for a disc herniation involved excision of a pedicle and a transdural approach, if SI joint dysfunction truly exists, patients in 2018 have to accept the reality of the state-of-the-art in 2018 when considering their options.

Thus, the ethics and debate can be distilled down to 2 questions.

(1) Is SI joint dysfunction a "real" problem with a physical or biochemical nature?
(2) Knowing that minimally invasive surgical (MIS) treatment for SI joint syndrome is in its infancy, how should patients be ethically counseled on the available treatment options?

DIAGNOSING SI JOINT SYNDROME IN 2018

Dysfunction of the SI joint as an etiology of low back pain has emerged as somewhat of a *cause celebre*, despite its relatively low prevalence[10–15] (10% to 30%) and diagnostic difficulty. A clinical history of buttock pain with low back pain is reported in up to 95% of patients diagnosed with SI joint syndrome[16] and, illustrating the extent of the diagnostic fen, other studies report patients denying lumbar pain as part of their symptomology.[3] These contradictory clinical histories highlight the nonspecific nature of the complaints and point to other etiologies apart from the SI joint[6]—soft tissue damage or dysfunction come to mind. Patients with pain in the region SI joint may have multiple etiologies to account for these symptoms. The lack of pathognomonic symptomatology clearly identifying the SI joint as the pain generator is critical to consider, and should engender caution, perhaps even reticence, when a diagnosis is being made. Some of the clinical maneuvers used during physical examination (Table 1) to diagnose SI joint syndrome overlap with degenerative hip disease and are in themselves nonspecific.[3,5,6,11] Imaging criteria[17] and intra-articular injections[18–20] historically have failed to provide an assuring underpinning to the diagnosis (and in the context of open surgery) leaving the clinician with focal joint pain,[21] localized to the sacral ala, as the sole criteria from which to launch a treatment plan.

In the present day, SI joint diagnosis has some parallels to the diagnosis of other clinical syndromes for which the pathogenesis is unclear or ill-defined, and symptomatology or history overwhelm any objective measurements. Patient suffering is evident in these syndromes, yet there are no objective tests—imaging, laboratory, or provocative—to confirm diagnosis. Fibromylagia is perhaps 1 such clinical syndrome that is familiar to the neurosurgeon or orthopedic surgeon. Classified as a rheumatologic disease, fibromyalagia requires no objective tests for diagnosis as laboratory values, imaging studies, and histopathology can all be normal. Its diagnosis is made through matching clinical history and a minimum number of tender points on clinical examination to a list of diagnostic criteria, constructed by physicians.[22–24] There is a constellation of minor criteria of nonspecific symptoms associated with the syndrome as well.[23] The natural history of this syndrome is physically benign in that there is no abnormal development of arthritis or deterioration of musculoskeletal function that occurs and treatments are medical therapies mostly targeted at norepinephrine, serotonin, and GABA neurotransmission; cognitive behavioral therapies are also recommended, and therapies have similar, minimally or moderately effective, results.[24,25] However, new research is evolving that may provide better insight into an objective diagnosis of fibromyalgia. Small studies have shown that circulating microRNA profiles differ between patients with fibromyalgia and age-matched and sex-matched controls.[26] Genome-wide expression profiling of patients with fibromyalgia have shown differential expression of genes associated with pain processing (glutamine/glutamate signaling, axonal development), inflammatory pathways, and hypersensitivity/allergy in comparison with age-matched controls.[27] Although genomic and micro RNA–based diagnosis of fibromyalgia is not yet clinically validated or routine standard of care, it is evident that fibromyalgia is a "real problem" where science has not yet reached the ability to accurately diagnose the disease. Perhaps, most importantly, is that fibromyalgia often gets misused as a last-resort diagnosis or a diagnosis of exclusion. Patients who claim to have a diagnosis of fibromyalgia may not actually have fibromyalgia at all. In the 2012 National Health Interview Survey, almost 75% of persons

TABLE 1. Maneuvers for Sacroiliac Joint Syndrome Physical Examination.

Clinical Maneuver	Motion
Distraction	Pressure on anterior superior iliac crest
Thigh thrust	Adduction of flexed affected hip
Compression	Compression of the thigh from lateral position
Fortin finger	Pt places 1 finger on source of pain 2 times
FABER (Patrick)	Flexion, abduction, external rotation of the thigh/hip
Gaenslen	Hip hyperextension
Gillet	Standing thigh flexion

If ≥ 3 of the above tests are positive, sensitivity and specificity range from 78% to 79% and 85% to 94%, respectively for the diagnosis of sacroiliac joint syndrome.

in the US population reporting a clinical diagnosis of fibromyalgia failed to actually meet diagnostic criteria![28]

Similar to fibromyalgia, chronic lyme disease (CLD), has nonspecific symptomatology and limited objective physical examination and laboratory evidence by which diagnosis is made.[29] Much like fibromyalgia, the term "chronic lyme disease" is fraught with confusion and misinformation. Lyme disease, when untreated, can lead to disseminated lyme disease weeks later with meningoradiculitis, facial palsy, encephalitis, or even lyme carditis. Years of untreated lyme disease, can lead to chronic borreliosis, including chronic destructive arthritis and acrodermatitis chronica atrophicans.[30] Particularly challenging is that the diagnosis of lyme disease is less than ideal. Current standard of care is to use clinical examination and history such as exposure to ticks in a geographic known to carry *Borrelia burgdorferi* along with a characteristic erythema migrans rash. Objective diagnosis typically requires a 2-tier serological approach with a sensitive ELISA test and confirmatory Western blot analysis which is more specific. Because these tests rely on the body's immune response, sensitivity is reliable in the later stages of lyme disease, but may be only 35% sensitive in early stages.[31] However, untreated lyme disease with late, nonacute symptoms is not synonymous with "chronic lyme disease." "Chronic lyme disease" is a phrase that has been used by patients or a small number of health care providers to patients with various nonspecific symptoms, including those with no objective evidence of lyme disease. These patients jump on the reality that current diagnostic methods of lyme disease have limited sensitivity in early stages and jump on this "termed" diagnosis. In some cases, neoplasms have been misdiagnosed and actual treatment was delayed due to a claimed diagnosis of CLD.[32]

In 2018, the evaluation of SI joint pain must be undertaken with caution. Just as many patients claiming to have fibromyalgia do not actually have fibromyalgia, patients reporting vague muscle pain in the buttock region or low back region should not automatically be assumed to have SI joint dysfunction. Likewise, SI joint dysfunction is not a diagnosis of exclusion. If no etiology for a patient's low back pain or buttock can be identified, they should be told that there is no diagnosis that can be identified to the best of our medical science. Practically speaking, SI joint dysfunction has potential overlap with lumbar spinal pathology and degenerative hip disease. Clearly, patients should first be ruled out for these issues. Traditional imaging has not yet been proven to be informative, however single photon emission computed tomography (SPECT-CT) may be informative in cases where objective imaging is considered.[33] Intra-articular injections may be helpful in diagnostic testing, although CT-guided injections have been reported to be superior in accuracy to fluoroscopic guidance[34] and may provide sufficient therapeutic response.[35] Sacral branch blocks may provide added diagnostic benefit, although the therapeutic benefits are not as clear.[36]

SURGICAL TREATMENT

As is the case with the previously discussed syndromes of fibromyalgia and CLD, the lack of clear diagnostic markers for SI joint syndrome makes interpreting the literature on surgical treatment difficult. Some patients diagnosed with SI joint dysfunction and subsequently treated in some studies, were likely misdiagnosed. Moreover, one cannot image the SI joint postprocedure to assess for differences as SPECT-CT has been the only diagnostic imaging to correlate with preoperative symptoms—postoperative SPECT-CT findings are unclear. Some ablative procedures[37,38] and anesthetic procedures[10,39] have been reported with some efficacy. In the Cohen et al[38] radiofrequency ablation trial which studied patients with $>75\%$ pain relief lasting 6 hours or longer after a single SI joint injection, the target was not the SI joint but the S1-S3 nerve foramina and in the Patel et al trial,[37] patients with a reduction of $>75\%$ relief of their index pain for at least 4 hours and up to 7 days following a diagnostic intra-articular injection were randomized and found to have sustained pain relief in 47% ($n=16$) of treatment group and in 12% of the sham control group at 3 months. A poor response of just 47% with sustained pain relief raises questions about the usefulness of these procedures; however, other studies using CT guidance have shown almost 90% success rates with intra-articular injections with 2-year follow-up.[40]

Review of the literature for surgical treatment is equally challenging. Surgical fusion of the SI joint has a long history dating back to 1908 with Painter's[41] posterior approach. This was modified by Smith-Petersen[42] to a lateral approach through the ilium with screw fixation. In these studies, the indications for fusion were gross instability from fracture and tubercular invasion of the joint for Painter[41] and chronic infection, tuberculosis, and "relaxation of the SI joint," for Smith-Petersen.[42] The techniques have been adapted to MIS techniques with fluoroscopically guided placement of triangular plasma coated titanium implants across the joint.[43] These MIS surgeries offer minimal soft tissue disruption, 3-cm incisions, shorter hospital stays, higher rates of fusion (the use of BMP aids in this),[44] diminished recovery times, and better clinical results.

The outcome reports of the MIS techniques have largely been industry funded. Rudolf,[43] in a retrospective study, report improvement of postoperative pain scores of 70% to 85% at 1 year after unilateral joint fusion in 46 patients treated for chronic degenerative sacroiliitis or SI joint disruption using an immediate reduction of $\geq 75\%$ in Visual Analog Scale pain scales after image-guided diagnostic block, history, and examination. Similarly, a large industry-funded case control series by Polly et al[45] reports 81.4% of surgical patients report improvement in pain scores of ≥ 2 mm on the Visual Analog Scale at 6 months and 83% of surgical patients report the same improvement at 24 months.[46] The inclusion criteria for the Polly trial are a source of controversy as there were no SI joint structural criteria, the intra-articular injection inclusion criteria of "at least a 50% transient decrease in SIJ pain 30 to 60 minutes after image-guided local anesthetic injection into the SIJ," do not match what has been published in the literature (discussed above),[37,38] and the clinical diagnosis was nonspecific. Complicating the interpretation of these positive surgical trials is Schutz and Grob's[47] series of 17 patients with negative results in which 82% of patients report worsening or no change in their pain score at last follow-up; however, Schutz and Grob's surgical intervention was bilateral, open surgery with decortication and placement of local bone grafting for chronic degenerative SI joint syndrome.

The dramatic discrepancy between Schutz and Grob's results and the MIS studies should raise red flags in the surgeon's mind. From the standpoint of SI "fusion" for a mobile joint as a pain generator (an unverified, hypothesized mechanism for SI joint syndrome is abnormal motion in the joint[21]), it is hard to imagine why open technique would have such poor results in contrast to MISs. Although soft tissue damage and early postoperative pain is a given, one would expect open SI fusion surgery to have good or even better long-term outcomes secondary to superior bony fusion in the same way an open

anterior lumbar interbody fusion offers superior fusion rates to minimally invasive transforaminal interbody procedures; however, if we look back to our original discussion about the historical treatment of disc herniation, it is certainly possible that the strategies for surgical treatment used in 2018 are flawed. Fusion or actual bridging bone across the SI joint may correlate with improvement SI joint pain, but it may not be essential to the specific mechanism by which treatment provides relief. In one of the present authors own practice (A.D.), a non–industry-funded study of SI joint pain diagnosed by CT-guided injections and treated with MIS triangular titanium implants over a 5-year period showed 19 of 20 successes. Despite the fact that fusion of the SI joint has been practiced for >100 years, it seems paradoxical to say it is in its infancy; however, in the current era of evidenced-based medicine, the surgical fusion of the SI joint for SI joint syndrome is so. There are few prospective randomized control trials. There is still argument among surgeons over diagnostic criteria for the diagnosis, indications for the procedure, and optimal technique. Procedures that treat the SI joint may not be directly comparable in outcomes and surgeons must look to the literature when considering surgical options.

ETHICS

Surgery is a conservative and slowly evolving field. Innovation in surgical practice typically arises from slow change in practice patterns over generations of surgeons with slight variations in technique becoming standardized after a time. Typically, these changes are minute—cortical sparing amygdalohippocampectomy instead of radical temporal lobectomy; percutaneous pedicle screw placement instead of open fixation; use of PEEK cages in anterior cervical discectomy and fusion instead of iliac crest graft.

Radical change in surgical practice is rare and is almost always fraught with controversy. The most notable examples are in transplant surgery: Baby Fae and Lewis Washkansky, for example. These 2 cardiac transplant patients were recipients of new procedures bourne out of meticulous research and study. Concurrent with these surgical advances were medical advances to support the surgical innovation—transplant surgery was not possible without advances in immunosuppressive therapies and significant advances in critical care. When these surgical innovations were proposed to the world, they heralded broad applicability, and unfortunately, they exacted a toll of human life. They were, however, targeted at readily identifiable disease processes. Baby Fae's baboon heart was placed because of hypoplastic left heart syndrome, the diagnosis of which is unassailable; Washkansky's human-to-human heart transplant was undertaken because of his congestive heart failure, after much evaluation by several surgeons and cardiologists practicing in South Africa.

To assess the ethical field surrounding a new, innovative surgical procedure, several considerations must be made. The scientific underpinnings of the procedure must be assessed, the field strength of the innovators and system in which the innovation is introduced, and the fallacy of desperate measures must be considered.[48]

The scientific background supporting a surgical innovation must be solid—that is the technique needs to be backed up with extensive research into the anatomy and physiology of a condition. This includes biological laboratory research into the pathophysiology of a disease state and treatments.[48–50] In deep brain stimulation (DBS) for Parkinson's disease, years of animal experimentation with development of animal models of the diseases have preceded treatments. As the indications for DBS expand, any expansion is preceded by extensive animal studies of the pathology and treatment of proposed DBS indications and targets. The funding agencies for the proposed expansion indications commission ethical studies on the use of DBS in those diseases. To date, for SI joint fusion using laterally implanted stand-alone fusion cages, there are 2 published cadaveric biomechanical studies.[51,52]

Field strength is a complex concept, well-described by Moore with regard to transplant surgeries in the end of the last century.[48] The field strength of a particular institution for a particular type of surgical innovation lies not only in the surgical skill, but also in the experience of the hospital team to assist the surgeon in the preoperative and postoperative care of the patient. For transplant surgery, not only is the skill of the surgeon important, but the preoperative patient evaluation and selection, postoperative ICU management, and postoperative immunosuppressive therapy and monitoring are all critical in the overall success of the procedure and are components of field strength.[48,49] The field necessary for successful SI joint fusion may not be as complex as what is required for organ transplantation, but it is important to consider.

The fallacy of desperate measures indicates that a patient who is suffering—be it from liver failure, progressive impairing tremor, or back pain limiting activity and function—will be more apt to consider a therapy if there is a promise of alleviation of that suffering, despite limited chances of success. The following illustrates this concept well:

The surgeon should be aware of the fact that patients threatened by severe illness display a surprising and sometimes alarming readiness to accept uncertainty and reach out for something new. The surgical scientist must avoid exploiting this willingness of patients to try something new in a desperate situation … This judgment should not be left to the patient, who will always seek new hope and new treatment in a desperate situation, but who lacks scientific background to make this judgment.[50]

Although Moore was discussing severe illness, the argument applies to back pain which inhibits function causing sufficient suffering to patients, making them more willing to consider any treatment that might provide relief, regardless of how limited that relief might be. SI joint fusion offers that dim glimmer of hope for relief, should the diagnosis of SI joint syndrome in that particular patient be accurate.

When evaluating surgical fusion of the SI joint as a treatment for a syndrome, the preponderance of evidence points to the procedure being unvalidated. Clearly, there are cases in which patients benefited from surgery and the literature for successes with MIS procedures is growing rather than shrinking. Symptom alleviation in that group of patients is convincing enough to underscore SI joint syndrome as an etiology. It is a real diagnosis. However, using surgery as diagnostic confirmation is unacceptable. SI joint pain is never a diagnosis of exclusion.

The temptation here is to throw the procedure out with the bath water. There are patients who will benefit from SI joint fusion. Frank discussion and informed consent between the clinician and the patient undergoing evaluation for SI joint surgery is imperative. That discussion should include the reality that the diagnostic criteria is still debated; that the surgical results are not entirely predictable; that there are few data available about the efficacy of this procedure that is not industry sponsored; that perioperative complications profiles can be high with a high learning curve—20% in 1 series[43]; that the most

comprehensive case control trial (industry sponsored) had minimal subjective pain reduction as a measure of efficacy[45,46]; and that the clinical data are variable with some studies report worsening of symptoms (which highlights the fact that not all SI surgeries are the same).[47]

Exercise of caution and restraint are in order when recommending this unvalidated procedure. Patients trust surgeons to be conservative—and the use of terms like innovative to describe a procedure only intimate the truth that a procedure is unproven. To respect the principles of autonomy, beneficence, and nonmalfeasance, full disclosure is imperative.

PRACTICAL CONSIDERATIONS

How then, does a conscientious surgeon, availing oneself to aiding patients, proceed?

SI joint syndrome is easy to diagnose when all clinical criteria are met and patients have a positive response to diagnostic blocks—but when the symptoms overlap and workup is incomplete or inaccurate, treatment and diagnosis become difficult—it is worth bearing in mind that the prevalence of the disease is at best 30% in patients presenting for evaluation of low back pain.[11,13–15] Importantly, the clinical examination by which SI joint syndrome is diagnosed is unreliable and the addition of further clinical maneuvers (Table 1) does not narrow in on the diagnosis—there are logical and statistical fallacies of significance associated with the addition of variables. Extracting the finer points of a patient history to distinguish SI joint syndrome from other causes of low back pain may require more time than available in an initial patient visit.

Diagnostic treatments have limited accuracy and precision. Repeat injections in the face of an initial diagnostic test are reasonable—but bear in mind that CT-guided injections are only accurate in 60% to 70% of cases.[10,12] Consideration must also be given to inflating the radiation load to which a patient is exposed—spine patients certainly see CT scanners frequently.

Moreover, as is the case for all other spine disorders, the presence of the disorder is not a mandate for surgical treatment. The treatment of advanced abdominal cancers is informative here—because the capacity to diagnose a disease which may be surgical exists does not at all mean that it should be surgically treated.

One principle of the scientific method and its daughter, evidence-based medicine, is that the algorithms developed to treat a particular condition today will certainly change as the understanding of a given disease progresses. Therefore, one must be willing to kill one's darlings and build new approaches as the science underpinning the clinical art is revealed. If, at the end of an extensive workup to rule out other etiologies such as lumbar spinal pathology and hip osteoarthritis, the diagnosis suggests SI joint dysfunction, it is reasonable to inform a patient of the uncertainty surrounding the diagnosis, and to present them a rational treatment plan with minimized risk. It is important to emphasize to the patient that SI joint dysfunction is never a diagnosis of exclusion, and before even undertaking diagnostic injections, the patient's level of pain and disability should be considered. If the pain is merely "annoying" or rare, patients should be counseled on activity modification, use of over-the-counter NSAIDs, given that there is no long-term consequence of SI joint "annoyance," the potential excess radiation exposure and health care utilization costs is not recommended.

Activity modification is truly the standard of care for SI joint syndrome. When a patient has tolerable symptoms that do not reduce daily or recreational activities, then avoidance of activities that exacerbate presenting symptoms are to be avoided. Because of the SI joint's unique anatomy, degeneration is inevitable—and symptomatic joint degeneration is expected and normal. When that is the case, there is no rush to proceed with surgical intervention. Counseling patients away from acting on a known diagnosis under the fallacy of desperate measures can prevent them from being harmed by treatments which may not be indicated—lumbar fusion for SI joint syndrome, for example, which is ineffective.

If a patient is being treated with opiates from a referring source, evaluation and treatment considerations change. Long-term outcomes of spine disorders in the presence of opiate use are poor.[1,53] Moreover, if symptoms are impacting daily and recreational activities and are becoming problematic to function, further investigation is warranted. These are patients who should be proactively evaluated for SI joint dysfunction.

As discussed extensively above, the physical examination for SI joint syndrome is unreliable and we do not recommend its use as sole indication for surgery. Clarifying the diagnostic criteria for SI joint syndrome is certainly critical; however, doing so is beyond the scope of the current discussion. The ethical principle of patient autonomy dictates that they be provided with adequate information to make a decision: they certainly should be informed that the diagnosis of SI joint syndrome is problematic and that the primary method of diagnosis, physical examination and clinical history, is unreliable. A leaping off point for diagnosis would be diagnostic injections—but this route is not entirely benign. CT-guided injection may be more accurate than fluoroscopic injection based upon seemingly higher outcomes in noncomparative studies,[34,40,54] but brings with it elevated radiation risk. Even our best diagnostic tool is only 70% accurate[55,56] and is therefore, not final.

When surgery is being considered, it is imperative to work closely with the physician who is performing the diagnostic tests. Knowledge of their technique and reassurance that patients have had the inaccuracies of the procedures explained to them is important. Patients also should be informed that false positive responses can occur and even technically well-performed SI surgeries with no clear "failure" will not have 100% success rates.

Discussing the surgical procedure with patients in appropriate detail is, as always, the key. Patients should know that open SI joint surgery has poor results, and though the surgery itself is not technically difficult, the major studies showing significant improvement in outcomes have predominantly been industry funded. Owing to the discrepancy between open SI outcomes and MIS outcomes, it is important the surgeons be familiar with the published literature for their implant of choice and the discussion of the long-term outcomes, if any, are available for that specific implant. Informed consent for this procedure includes a discussion that failure may occur at "n+1 day" of what has been published and that techniques and implants continue to evolve. In this discussion, patients should know that the postoperative treatment has yet to be optimized specifically in terms of appropriate weight bearing restrictions (if any), duration of these restrictions as well as any anticoagulation that may be beneficial. Reassurance of long lasting to commitment to treat potential complications arising from this procedure is the duty of any surgeon performing this procedure. As SI joint surgery is an uncommon procedure, patients should be informed of this and surgeons should be well-trained before undertaking this procedure. As always, a well-informed and honest physician/patient discussion prepares both for any outcome.

FINAL CONCLUSIONS

In summary, existing or possible diagnoses of SI joint syndrome should be viewed with healthy skepticism, but not entirely discounted. Maintaining a diagnostic differential and adapting or developing a treatment plan accordingly is just good doctoring. SI joint is not a diagnosis of exclusion. Primum No Nocere. Moreover, providing patient with the dignity of choice empowers the patient and the physician to proceed—SI joint fusion for the indication of pain is an elective procedure with activity modification as the standard of care. And should surgical intervention be considered, surgeons must know the literature for their preferred implant and be prepared and well-trained on their preferred implant—there is, after all, a moral imperative to surgical competence.

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